

# PATENT ABSTRACTS OF JAPAN

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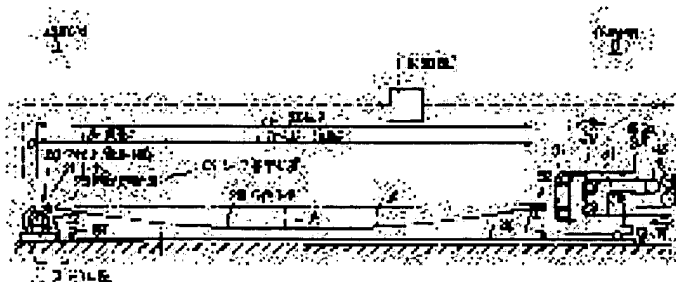
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## (54) CONTROL FOR STRIP MEMBER STORING DEVICE

### (57)Abstract:

**PURPOSE:** To prevent the collision trouble of a loop car by correctly detecting the position of the loop car, obviating the necessity of the fulcrum for a wire rope such as a supporting roller, in the control for a metal strip member storing device in a continuous processing line for a strip member.

**CONSTITUTION:** As for a strip member storing device which is equipped with a loop car 30 equipped with a plurality of louver rolls 30 for winding up a strip steel 35 and a wire rope holding member 32, and a wire rope taking up machine 20, the strip steel is stored by shifting the loop car 30 to the storage side, in the ordinary passing of the strip steel. When the loop car 30 is shifted to the feed side by taking up a wire rope 25, the strip member feeding quantity supplied from the upstream side of the line is adjusted by calculating the position from the standard point of the loop car, and the position of the loop car is correctly controlled.





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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention relates to the storage device of the metal band material in belt material continuous processing lines, such as a continuation cold rolling line and a continuous-annealing pickling line.

[0002]

[Description of the Prior Art]Drawing 4 is a side view showing the concept of an example of the conventional belt material storage device.

[0003]The hoop iron 35 conveyed from the hoop iron welding machine for example, it did not illustrate, as shown in drawing 4 is wound around the deflector roll 40 attached pivotally by [ which were attached pivotally by the loop car 30 enabling free rotation / the looper roll 31 and above the floor level ] enabling free rotation, and for example, it does not illustrate, it is fed into a cold-rolling-mill group. And at the time of the usual plate leaping of the hoop iron 35, the wire rope 25 which was wound around the sheave 32 attached to the loop car 30, and was supported by the support rollers 26 and 27 was rolled round on the drum 21 of the wire rope winder 20, the loop car 30 was moved to the storage side A, and the hoop iron 35 is stored.

[0004]If feeding of the hoop iron 35 stops for welding of the hoop iron 35 by the welding machine which is not illustrated, in order not to stop the cold-rolling-mill group which is not illustrated, It \*\*\*\* like a graphic display of the wire rope 25 currently rolled round to the drum 21, and the loop car 30 is moved to the supply side B, and the cold-rolling-mill group which does not illustrate the stored hoop iron 35 is supplied.

[0005]In the case of movement of the loop car 30, each proximity switches 37 and 38 detect approach to the support rollers 26 and 27, the support rollers 26 and 27 attached pivotally by the arm 28 by the oil hydraulic cylinder 29 are upset caudad one by one, and the collision with the loop car 30 is avoided.

[0006]If the motor 22 of the wire rope winder 20 is always energized in the rolling-up direction and the number of rotations (the amount of feeding) of the pay off reel which the line upper stream does not illustrate is increased, With tension, such as a cold-rolling-mill group etc. of the lower stream which will not be illustrated if it moves to the storage side A,

the hoop iron 35 is stored and said pay off reel is suspended, the loop car 30 and the wire rope 25 are pulled, and move to the supply side B, and the loop car 30 supplies the hoop iron 35.

[0007]And the angle-of-rotation detector 23 detects angle of rotation of the drum 21, The wire rope 25 rolls round and \*\*\*\*, a size is computed, the position of the loop car 30 from the zero 0 is detected, if the loop car 30 becomes exceeding predetermined run \*\*\*\*\*, the number of rotations of said pay off reel will be adjusted, and the collision with the wire rope winder 20 or the deflector roll 40 will be prevented.

[0008]Both limit switches 39 are safeguards when the loop car 30 becomes exceeding predetermined run \*\*\*\*\*.

[0009]Between [ L1 ] the drum 21, each support rollers 26 and 27, and the sheave 32, in L2 and L3, the wire rope 25 bends with the prudence, a stress area, an elastic coefficient, and the tension of the hoop iron 35, and h1, h2, h3, and elongation generate it. The tension of the hoop iron 35 is determined by the board thickness, the board width, construction material, etc.

[0010]

[Problem(s) to be Solved by the Invention]By the way, since the bending h1 when the wire rope 25 is \*\*\*\*(ed), h2, h3, and said elongation were disregarded in the above conventional devices and the position of the loop car 30 was detected, If the distance L from the zero 0 becomes large, the error of a detection position will become large, and there is a danger that the loop car 30 will collide that the detecting position of the loop car 30 by the proximity switches 37 and 38 is uncertain with the support rollers 26 and 27.

[0011]This invention cancels the nonconformity points of a device conventionally [ above-mentioned ], enables detection of the position of a loop car correctly, and makes wire rope fulcrums, such as a support roller, unnecessary, It aims at providing the new control method of avoiding the collision of the loop car to the support roller by proximity switch malfunction of a loop car.

[0012]

[Means for Solving the Problem]As composition for attaining the above-mentioned purpose, a control method of a belt material storage device of this invention, A loop car possessing two or more looper rolls which wind a wire rope attachment component and belt material, In a belt material storage device possessing a wire rope take-up motion which a wire rope is \*\*\*\*(ed) by rotation of a drum from the storage side according to a supply side of this loop car, and movement by the side of storage, and is rolled round, Detect angle of rotation of said drum, said wire rope from a reference position of said loop car to said wire rope attachment component \*\*\*\*, and a linear dimension is computed, this -- it \*\*\*\*(ing), and a bending size and this arc linear dimension bending (circle) of said wire rope with a linear dimension, [ compute and ] Furthermore an elongation size of said wire rope is computed, it adds to said arc linear dimension, and an elongation size of said wire rope is computed further, it adds to said arc linear dimension, a position of said loop car is computed, and a belt material quantity to be stored is controlled.

[0013]

[Function]Although it was made to move to the loop car storage-side at the time of the usual plate leaping of hoop iron and hoop iron is stored in the control method of the belt material

storage device of this invention, If the wire rope currently rolled round to the drum if feeding of hoop iron stops for welding of hoop iron is \*\*\*\*(ed) and a loop car is moved to a supply side, Prudence of a wire rope, a stress area, an elastic coefficient, a size between fulcrums, and an arc linear dimension of the circle according to bending by the tension of said belt material, An elongation size is computed and it is extended with this arc linear dimension, and the position from the reference point of a loop car is computed, the belt material amount of supply from the line upper stream is adjusted, and the position of a loop car is correctly controlled by the sum with a size.

[0014]Therefore, since the error of the detection position of a loop car is lost even if the distance from a reference point to a loop car becomes long and bending becomes large, Wire rope fulcrums, such as a support roller, become unnecessary, and the occurrence of the collision to the support roller of the loop car by proximity switch malfunction like a device before can be prevented.

[0015]

[Example]A drawing explains one example of this invention below. The side view showing the concept of a belt material storage device that drawing 1 applies the one example method of this invention, the block diagram in which drawing 2 shows the composition of the operator control panel of drawing 1, and drawing 3 are the flow charts showing the control procedure of this invention control method.

[0016]The same numerals are given to the same conventional member and part as a device, and the overlapping explanation is omitted to them.

[0017]In drawing 1, 1 is an operator control panel and is connected with the drive of other apparatus, such as a pinch roll which the angle-of-rotation detector 23 of the wire rope winder 20 and the line upper stream do not illustrate, and a bridle roll of the line lower stream.

[0018]By this invention, since it is unnecessary, the support rollers 26 and 27 in the conventional device shown by drawing 4, the arm 28, the oil hydraulic cylinder 29, and the proximity switches 37 and 38 are removed.

[0019]As shown in drawing 2, the angle-of-rotation detector 23 was connected, \*\*\*\*(ed) the operator control panel 1, and did not illustrate it with the size conversion part 2, the move size operation part 3, the wire rope condition storage section 4, and the hoop iron tension operation part 5, and also it was connected with the equipment driver, and also it possesses the apparatus operation directions part 6.

[0020]At the time of the usual plate leaping of the hoop iron 35, the wire rope 25 wound around the sheave 32 was rolled round on the drum 21, the loop car 30 was moved to the storage side A, and the hoop iron 35 is stored.

[0021]If feeding of the hoop iron 35 by the pay off reel which is not illustrated for welding of the hoop iron 35 by the welding machine which is not illustrated stops, It \*\*\*\* like a graphic display of the wire rope 25 currently rolled round to the drum 21, and the loop car 30 is moved to the supply side B, and the cold-rolling-mill group which does not illustrate the stored hoop iron 35 is supplied.

[0022]A following loop car position calculation equation and wire rope extensometer formula are beforehand inputted into the move size operation part 3 in the operator control panel 1.

loop car position  $L = l_0 + n \cdot \pi \cdot D \cdot \text{Bend.}$  . taking out  $h = wL^2 / 8 T$  volumes -- length

$l = \text{gamma} \text{ and } 2\beta \cdot \pi / 180$  -- here up to the reference position 01 of an  $l_0$ : loop car (sheave) --

arc length --  $n$  : Number of rotations  $D$  of a wind drum : Diameter  $T$  of a wind drum : Tension  $w$  of hoop iron : weight  $r$  Per unit length of a wire rope. : Circle radius  $r = 1/2 \{(L^2/4h) - h\}$

$\beta$  : the degree of arc angle  $\beta = \sin^{-1} (1/2, \text{ and } L/\text{gamma})$

elongation  $\text{Epsilon} = l/(E \cdot A/T)$

here  $E$ : -- elastic coefficient  $A$ : of a wire rope -- stress area of a wire rope [0023] Wire rope conditions, such as weight per unit size of the wire rope 25, a stress area, and an elastic coefficient, are beforehand inputted into the wire rope condition storage section 4 of the operator control panel 1.

[0024] When drawing 3 explains the control procedure of this invention control method below, in the case of movement (Step 51) of the loop car 30. The angle-of-rotation detector 23 detects angle of rotation of the drum 21, and transmits to the operator control panel 1 (Step 52), the operator control panel 1 \*\*\*\* it, by the size conversion part 2, the wire rope 25 \*\*\*\* it and it computes a size (Step 53).

[0025] Next, the tension is computed by inputting hoop iron conditions, such as board thickness of the hoop iron 35, the board width, and construction material, into the hoop iron tension operation part 5 of the operator control panel 1 (Step 54), Arc linear dimension  $l$  and the elongation size  $\text{epsilon}$  by the bending  $h$  of the wire rope 25 are computed by said move size operation part 3 (Step 55), it is further extended with this arc linear dimension  $l$ , and the move size (position) from the zero 0 of the loop car 30 is computed by the sum with  $\text{epsilon}$  (Step 56).

[0026] The position of the detected loop car 30 controls \*\*\*\*\* and the pay-off-reel drive which is not illustrated to predetermined run \*\*\*\*\* (Step 57), The amount of supply of the hoop iron 35 from the pay off reel which is not illustrated is adjusted, the loop car 30 is moved (Step 51), and it is made not to exceed the run \*\*\*\*\*.

[0027] Although one example of this invention was described minutely above, this invention is not limited to the above-mentioned example, and can be variously changed within the limits of this invention technical thought, and each of them belongs to the technical scope of this invention.

[0028]

[Effect of the Invention] As explained above, according to the control method of the belt material storage device of this invention, detect angle of rotation of a drum, the wire rope from a reference point to a wire rope attachment component \*\*\*\*, and a linear dimension is computed, this -- it \*\*\*\*(ing), and the bending size and this arc linear dimension bending (circle) of a wire rope with a linear dimension, [ compute and ] It becomes possible by computing the elongation size of a wire rope furthermore, adding to an arc linear dimension, and computing and controlling the position from said reference point of a loop car to detect the position of a loop car correctly.

[0029] Therefore, since the error of the detection position of a loop car is lost even if the distance from a reference point to a loop car becomes long and bending becomes large, The stop of the line by the operation of the limit switch which wire rope fulcrums, such as a

support roller, became unnecessary, and became that the collision to the support roller by proximity switch malfunction of a loop car and run \*\*\*\*\* are likely to be exceeded can be prevented.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1]It is a side view showing the concept of the belt material storage device which applies the 1 example control method of this invention.

[Drawing 2]It is a block diagram showing the composition of the operator control panel in drawing 1.

[Drawing 3]It is a flow chart showing the control procedure of this invention.

[Drawing 4]It is a side view showing the concept of one example of the conventional belt material storage device.

[Description of Notations]

0 Zero

01 Sheave reference position

1 Operator control panel

20 Wire rope winder

21 Drum

23 Angle-of-rotation detector

25 Wire rope

30 Loop car

31 Looper roll

32 Sheave

35 Hoop iron

A Storage side

B Supply side

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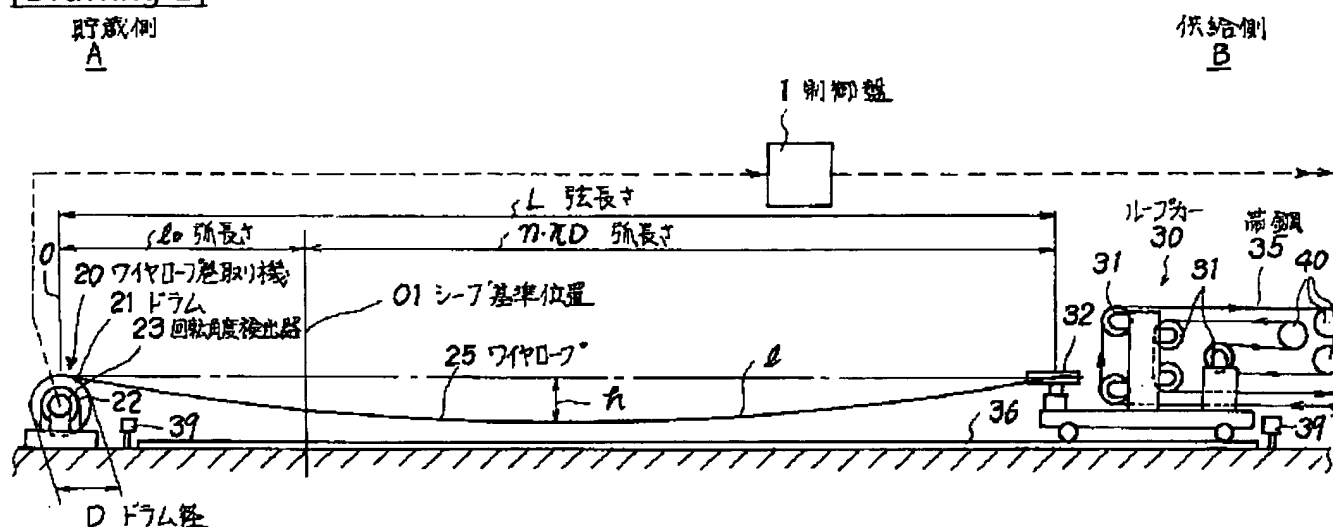
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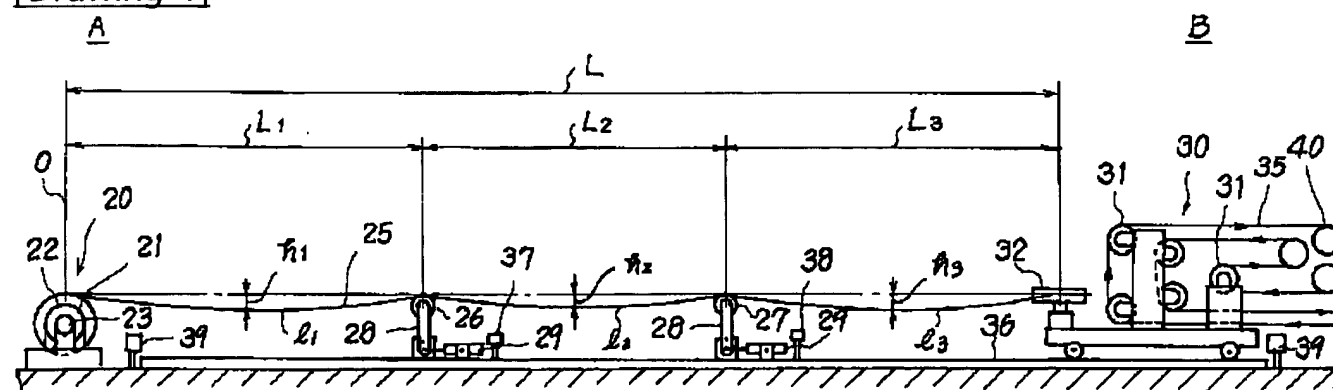
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## DRAWINGS

[Drawing 1]

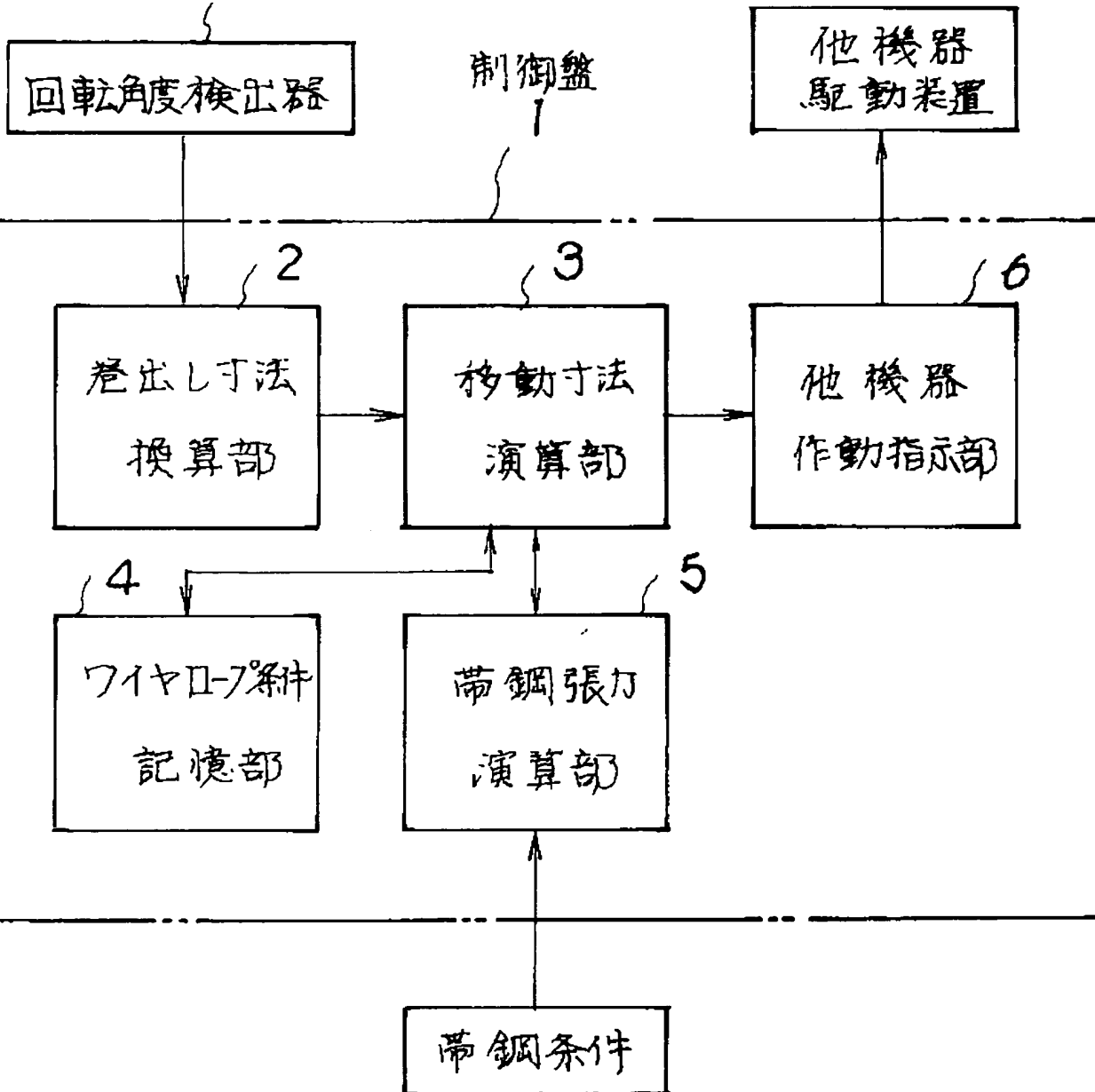


[Drawing 4]

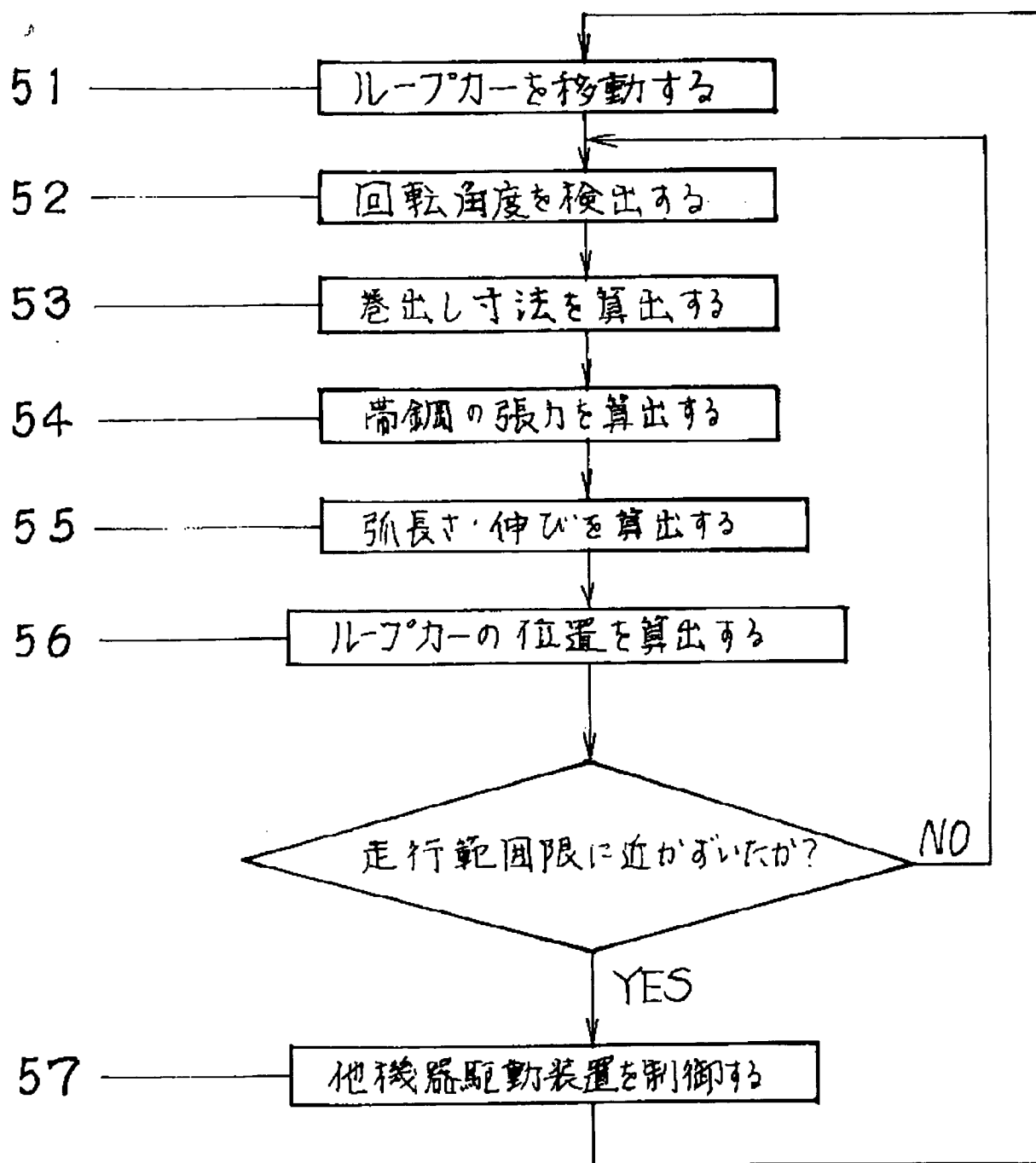


[Drawing 2]

23



[Drawing 3]



[Translation done.]